DANGEROUS COMMUNICABLE DISEASES.

HOW SPREAD, HOW RESTRICTED AND PREVENTED.

Data and Statements Supplied to School Superintendents and Teachers by the Michigan State Board of Health, in Compliance with Act No. 146, Laws of 1895.

[Fourteenth Edition, August, 1903, 30,000, 203,000 Printed.]

[281]

[This may be conveniently kept inside the cover of the text-book on Physiology.]

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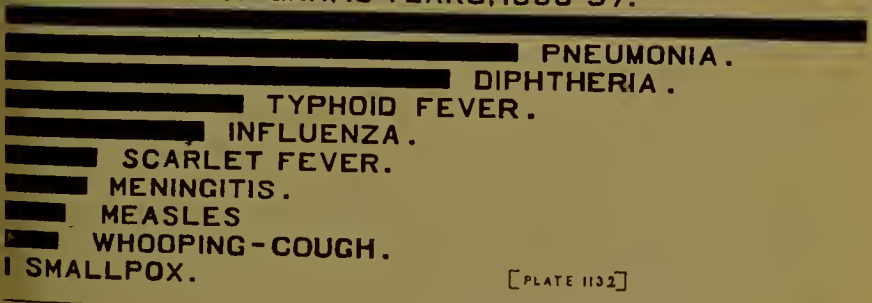
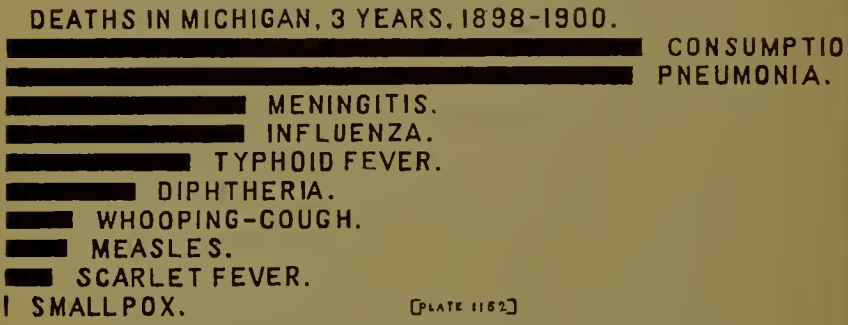
In Michigan the most dangerous communicable diseases, named in the order of their importance as causes of deaths during the ten years ending in 1897, were consumption, pneumonia, influenza (la grippe), diphtheria, typhoid fever, scarlet fever, measles, whooping-cough and smallpox.

The relative importance of these diseases, in those years, is shown by the diagram below, the first solid line representing consumption:



*Section 1 of this act requires "That there shall be taught in every year in every public school in Michigan the principal modes by which each of the dangerous communicable diseases are spread, and the best methods for the restriction and prevention of each such disease. The

Averaging the three years, under the new law, 1898-1900, the latest yet compiled by the State Department, the order of importance of the dangerous communicable diseases, as causes of deaths, was as follows: Consumption, pneumonia,† meningitis, influenza (la grippe), typhoid fever, diphtheria, whooping-cough, measles, scarlet fever and smallpox. This is graphically exhibited by Plate 1152.



As the diagram, Plate 1152, is for so short a period, it is proper to know that each of the three years was exceptional as regards one disease or more. In the year 1898 much more, and in 1899 very much more than the usual number of deaths were reported from menin-

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State Board of Health shall annually send to the public school superintendents and teachers throughout this State, printed data and statements which shall enable them to comply with this act. School boards are hereby required to direct such superintendents and teachers to give oral and blackboard instruction, using the data and statements supplied by the State Board of Health."—Sec. 4796, Compiled Laws 1897: Sec. 23, Public Health Laws 1899. (Section 2 provides penalties for non-compliance.)

†Even if the disease reported as broncho-pneumonia were included, pneumonia would not precede consumption.

gitis. In the year 1899, influenza was epidemic,—over three times as many deaths being reported from it as in either the preceding or succeeding year. In the year 1900 more than the usual number of deaths were reported from typhoid fever and also from measles.

If we consider smallpox as a measure of danger from a communicable disease, the comparative danger from each of the diseases represented in these diagrams may be readily appreciated by comparing the space which correctly represents each disease.

Principal modes by which the communicable diseases are spread.—Dangerous communicable diseases owe their existence to the presence of minute living organisms which are usually conveyed into the body by means of dust inhaled, food or drink consumed, or by insects, such as flies or mosquitoes, all of these being liable to become infected with disease producing organisms. Once in the body, most of these organisms multiply very rapidly, and through their life processes produce poisons which are taken into the circulation and cause sickness and death. After invasion of a tissue by one species of such organisms a subsequent invasion by the pus-producing organisms which are extremely common not infrequently follows. This second infection usually increases the bad effect of the first.

Consumption, as shown by the above diagram, caused more deaths than any other disease. Though the lungs are usually the seat of this disease, yet not infrequently

other organs of the body are attacked. Consumption, wherever located, is caused by a minute living organism which, after having gained access to some tissue of the body, multiplies rapidly, causes minute swellings called tubercles, and forms poisons which produce the wasting away of the body which is such a well-marked characteristic of this disease. Tubercles in the lungs of a person suffering from consumption frequently break down, and the matter contained in them is coughed up. This matter contains the organisms of the disease, and these organisms under certain conditions may retain their vitality for months, or perhaps years. A single drop of this sputum may contain myriads of these so called tubercle bacilli which are released when the sputum dries, and may then float in the atmosphere. Air thus infected may produce the disease if inhaled by a person suffering from any irritation of the air passages, the result of a cold or any other cause, especially if such person is peculiarly susceptible to the disease. It is, therefore, by means of sputa coughed up by a consumptive that the disease is usually spread. Another means by which the disease is probably spread, especially to children, is from the use of milk from tuberculous cows. Many herds contain animals affected with consumption, and without doubt the meat from such animals as well as the milk may cause consumption in human beings. The tubercle bacilli are responsible for every case of consumption.

Pneumonia.—This is a disease of the lungs. Unlike consumption its course is rapid, fatal cases frequently terminating in from five to ten days. It also owes its existence to minute living organisms which gain access to the air-cells of the lung and rapidly multiply.

Any one of at least three different organisms may be responsible for pneumonia. At least one of these organisms has been frequently found in the saliva of perfectly healthy persons, possibly because not much effort has yet been made to restrict this disease. It is by means of sputa containing one or the other species of organisms capable of producing pneumonia that this extremely dangerous disease is usually spread. The colder months of the year and those following are the months during which pneumonia prevails most extensively, and during which it sometimes assumes an epidemic form.

Meningitis.—This disease, like pneumonia, is apparently due to more than one organism, and like pneumonia it sometimes becomes epidemic.

It is a disease of the membranes of the brain and spinal cord. It frequently accompanies outbreaks of pneumonia, and it has been shown that the same organisms may be present in either of these diseases. In one case they act upon lung tissue to produce pneumonia and in the other upon the membranes of the brain or spinal cord to produce meningitis.

Influenza.—Influenza (la grippe), is probably the

most familiar disease known. In its epidemic form, popularly known as "grippe," it has prevailed very extensively during the last ten years. Influenza is caused by a specific organism peculiar to this disease, discovered by Pfeiffer in 1892. Germs of influenza are found in the bronchial and nasal secretions, and in the sputa of those suffering from the disease. The disease is, at times, a very serious one, it having caused in Michigan, during the first four months of the year 1899, 1,645 deaths. It is usually accompanied or closely followed by epidemics of pneumonia and meningitis, while deaths from consumption following much later are usually greatly increased. In such cases meteorological conditions are primarily responsible for a lack of power to resist not only the influenza organism, but also those organisms which directly cause pneumonia, meningitis and consumption.

Diphtheria.—Diphtheria is due to the presence in the throat of an organism peculiar to this disease alone. The result of its activities is a most powerful poison, and it is to this poison rather than to the injury to the tissues of the throat that the sickness and death from diphtheria are due.

The organisms of diphtheria often remain in the throat weeks after apparent recovery from the disease. During this period they may retain their virulence, and sputa containing them is then dangerous. This is an important fact, and constitutes the danger of permit-

ting one recently recovered from this disease to associate with his fellows.

Human saliva and nasal discharges.—In considering the question of restriction of the diseases so far named, these important facts must be borne in mind: That the direct causes of the diseases are microörganisms found in sputa and nasal discharges. That it is usually the sick alone who are bearers of these microörganisms, but that the sputa and nasal discharges of the well sometimes contain them. That they may be harmless until certain meteorological conditions arise which enable them to obtain access to the bronchial tubes, the tonsils, the meninges, or other organs where they produce abnormal conditions of the tissues, or fluids, and elaborate poisons which may destroy health or life. The organisms are in the infected air breathed into the lungs, or upon substances taken into the mouth. This air and these substances may have become infected by means of the sputa or nasal discharges not only of sufferers from these diseases, but also of those apparently well. The atmosphere is liable to contamination from these sources, for it is continually taking up and wafting through homes, schools, public halls and conveyances, shops and stores, the millions of organisms which may be contained in each drop of sputum with which it comes in contact.

Our present knowledge leads to the belief that the organisms of these diseases contained in sputa and

nasal discharges are the most frequent cause of each case of consumption, pneumonia, influenza, tonsillitis and diphtheria, and indirectly of many other diseases. Could these dangerous sputa and discharges all be destroyed as soon as ejected, a great portion of these diseases would soon disappear. Believing this to be true, we are confronted with the practical problem of how this may be done either wholly or in some large degree. Probably these diseases are not usually caught or contracted except through some break in the skin or in the mucous membrane lining some cavity. Such breaks or ulcerations occur not infrequently in the throat at those seasons of the year when the atmosphere is what is known as "raw," that is, when it contains the throat irritant ozone, and when it is irritating by reason of its drying effect in cold, windy weather. The nose is so constructed, and so guarded by minute hairs, kept moist by the exhaled breath and by secretions, that very little dust among which disease producing organisms may be present is permitted to pass beyond it, so long as that organ is in its normal condition. Knowledge of the dangers which may lurk in sputa and in the discharges from the nose should go far towards the solution of the problem of how people may be induced to refrain from contaminating air with these discharges. In the solution of this problem the influence of the teachers in our schools should be most potent. They may and should impress upon the mind of the youth who are under their charge that spitting upon

floors, sidewalks or other places where garments or the atmosphere may thereby become infected is not only a filthy habit but it is, besides, dangerous to health and life. The common use by pupils of pencils, chewing gum, drinking cups or any other articles likely to be placed in their mouths should be discouraged, and the danger of such practices explained.

The principal means by which the germs of these diseases are spread are:

1. Dust from infected handkerchiefs. (A general rule applicable to all persons, sick and well, is that handkerchiefs should be looked upon with suspicion. They should not be used after any secretion from the nose has been permitted to dry upon them. After being used they should be put into a paper bag which may then have its top twisted shut, there to remain until put into boiling water.)

2. Dust from floors or articles upon which infected sputum or saliva has been ejected.

3. Contact with the hands of persons who cough into their hands, or who handle infected handkerchiefs or cloths into which they have spit.

4. Dust from rooms or clothing infected by persons having a communicable disease.

The restriction of diseases.—The "general directions" published in this pamphlet apply to all the diseases so far considered except that it is impracticable to isolate persons suffering from influenza or consump-

tion, or to placard their homes. Victims of these diseases may attend to their usual avocations so long as they are able, without great danger to their associates, provided they carefully disinfect or burn their sputa and nasal discharges.

It is best that all persons who have a cough should carry small pieces of cloth (each just large enough to properly receive one sputum) and paraffined paper envelopes or wrappers in which the cloth, as soon as once used, may be put and securely enclosed, and, with its envelope, burned on the first opportunity.

Typhoid fever is not often contracted directly from one sick with the disease, but usually from the use of food or water contaminated by the discharges from the bowels or bladder of the sick person. These discharges if dried may spread the disease through the air in the same manner as do infected sputa and nasal discharges. The chief source of danger, however, is believed to be drinking water contaminated by sewage or leachings from privies, etc. Prof. Victor C. Vaughan, and other members of a commission appointed by the United States Government, in a report on the causes of the large number of cases of typhoid fever in our armies during the Spanish war, has shown that house flies were the carriers of the infection from the contaminated latrines of the soldiers to their food. How far these insects may be responsible for the spread of this disease in civil life is uncertain, but there is reason to

believe that it is by no means inconsiderable. The organisms have been found in the sputum; they permeate the entire body of an infected person, and are sometimes found, in excretions and abcesses, after apparent recovery.

The organisms of typhoid fever are not always killed by freezing but they are killed by boiling. All suspected water should be boiled. Milk frequently becomes contaminated with the organisms of typhoid fever as well as those of several other diseases. It is generally safest, therefore, to either sterilize or Pasteurize milk before feeding it to infants or children.

Scarlet fever.—That there is a germ of scarlet fever, seems to be proved by the well known communicability of the disease from person to person. It is spread by the discharges from the nose, mouth and throat, and probably also by the minute scales which are thrown off from the surfaces of the body. Isolation and disinfection are the measures by which this disease is restricted.

Measles is spread from person to person, directly and indirectly. Isolation and disinfection should be enforced.

Whooping-cough is a communicable disease which, in Michigan, causes more deaths than does smallpox. Whooping-cough is spread from person to person, directly and probably indirectly. Most of the follow-

ing "general directions," except, perhaps, those for disinfection of the discharges from the kidneys and bowels. are applicable for its restriction.

Smallpox.—Smallpox is a contagious disease; it spreads by means of particles given off from the surfaces of the body. The following rules are applicable for the *restriction* of smallpox, whenever the disease occurs; but by vaccination and revaccination, smallpox may be and should be *prevented.* One vaccination or once having smallpox does not always protect for life. Revaccination should be had once in about five years, also whenever smallpox is prevalent, and certainly immediately after one has been exposed to the disease.

Cholera, leprosy and the plague are all diseases which are due each to a specific living organism like those we have been considering. They have caused many times more deaths than has war. We do not consider them now for they have been generally driven from civilized countries by measures similar to those found efficient in restricting those diseases which still prevail.

General directions for the restriction and prevention of diphtheria, scarlet fever, and smallpox: some of which directions, relative to disinfection, are applicable to consumption, pneumonia, meningitis, influenza (la grippe) and other diseases.

1. To avoid the contagium or special cause of the disease:

Isolation and disinfection are the important meas-

ures. Unless you are needed to care for the sick or are protected by having recently had the disease, or in case of smallpox, by thorough vaccination, do not go near the sick person. Do not allow your lips to touch any food. cup or spoon, or anything else that the sick person has touched or that has been in the sick room. Do not wipe your face or hands with any cloth that has been near the sick person. Do not wear any clothing that the sick person has worn, during, just before, or just after his sickness. Keep your hands free from discharges from the body or skin of the sick person. Do not touch him with sore or scratched hands. Avoid inhaling or in any way receiving into the mouth or nose the branny scales that fall or peel from one recovering from, or apparently wholly recovered from scarlet fever; also any dust from the dried saliva of a person sick with or recovering from scarlet fever or diphtheria. The germs of diphtheria sometimes remain in the throat weeks after apparent complete recovery.

2. To restrict the contagium or special cause of the disease:

Isolate the sick. Separate those sick with any of these diseases, even if they are but mildly sick, from all persons except necessary attendants. A person sick with any of these diseases should not be permitted to suffer for want of care, food, or comfort; but all his wants should be attended to by adults or by those who are protected by proper vaccination or by having had the disease. Children, and those who are not thus

protected, should be kept away from these diseases. Except it be disinfected, no letter or paper should be sent through the mail from an infected place. Do not go from a sick room to a child or other unprotected person until after change of clothing and thorough disinfection of hands, face, hair and beard.* After any handling of the sick person or anything that has been in contact with the sick person, always disinfect the hands thoroughly by washing them in a two per cent solution of carbolic acid, or a one to one thousand solution of mercuric chloride (corrosive sublimate). Keep those who have been exposed to any of these diseases away from schools, churches, and other assemblies, and from all children, until it is known whether they are infected,—and if they are found to be infected, isolate them until after complete recovery and thorough disinfection.

3. To destroy the contagium or special cause of the disease:

a. Thoroughly disinfect or destroy whatever is removed from the person sick, or from the sick room. All discharges from the lungs, nose, throat and mouth, should be burned or disinfected. All other discharges from the patient should be received into vessels containing a five per cent solution of carbolic acid, in quantity equal to or greater than the discharge to be

*Corrosive sublimate, one part to one thousand parts of cologne or water, is sometimes used by physicians for this purpose. This solution should be labeled POISON.

disinfected, and then thrown into a water-closet connected with a sewer; or where this is impracticable they may be received on old cloths which should immediately be burned or disinfected and buried at least 100 feet distant from any well.

b. Thoroughly disinfect the sick room and its contents, after removal of the sick person, whether by death or recovery. Disinfect as follows:

Burn whatever has been in contact with the sick person and is not too valuable to burn. Garments, sheets, blankets, etc., such as will not be injured thereby should be boiled for half an hour. After death or recovery of the patient, subject the room and *all its contents* to the vapors of formaldehyde or burning sulphur. Before fumigating, hang up and loosely spread out clothing, bedding, etc., or spread them loosely over chairs, leaving the bedstead, other furniture, and everything in the room. Close all openings to the room very tightly. For a room ten feet square, distil eight ounces of the formaldehyde solution into the room through the keyhole (as illustrated in Teachers' Sanitary Bulletin, June, 1901), or sprinkle this amount of the solution on an ordinary sheet previously hung up in the room; or place three pounds of sulphur in an iron pot or pan, that will not leak, supported on bricks over water in a tub. Set the sulphur afire with live coals or with a spoonful of alcohol lighted by a match. Be careful not to breathe the sulphurous fumes. Leave the room tightly closed for several hours, then air it

thoroughly. For a large room use a proportionally larger quantity of sulphur at the rate of three pounds for each 1,000 cubic feet of air space, and burn as much as possible of the sulphur used.

4. Keep your premises and everything connected therewith clean, but remember that *the contagium of these diseases may attach to the cleanest article* of clothing, food, drink, book or paper, if it is exposed thereto.

5. The law requires householders and physicians to notify the local health officer of the first case and of every case of one of these diseases. The penalty for violation of this law may be as much as one hundred dollars. Plain and distinct notices should be placed on the house or premises in which there is a person sick with one of these diseases.

Unless the local board of health orders otherwise, whoever violates the orders of the health officer is liable to a fine, and to imprisonment if the fine is not paid.

More complete statements of means of restricting and preventing these diseases, are in the pamphlets issued by the State Board of Health, on the "Restriction and Prevention of Consumption," the "Restriction and Prevention of Diphtheria," the "Prevention of Typhoid Fever," the "Restriction and Prevention of Scarlet Fever," "Advice for the Restriction and Prevention of Meningitis," the "Restriction and Prevention of Measles," the "Restriction and Prevention of Whooping-cough," and the "Prevention of Smallpox," any of which may be had by addressing the Secretary of the State Board of Health, Lansing, Michigan.